Appendix D

TAKING SHELTER FROM THE STORM BROCHURE

Extreme windstorms such as tornadoes and hurricanes pose a serious threat to buildings and their occupants in many areas of the United States. Tornadoes strong enough to damage roofs, destroy mobile homes, snap or uproot large trees, and turn debris into damaging windborne missiles have occurred in virtually every state. Hurricanes have affected all Atlantic and Gulf of Mexico coastal areas in the United States, including Puerto Rico and the U.S. Virgin Islands. Hawaii has also been affected by hurricanes. Even states not normally considered susceptible to extreme windstorms include areas threatened by dangerous high winds. These areas, typically near mountain ranges, include the Pacific Northwest coast.

Do You Need a Shelter?

The wind zone map on this page shows how the frequency and strength of extreme windstorms vary across the United States. This map is based on 40 years of tornado history and over 100 years of hurricane history. Zone IV, the darkest area on the map, has experienced both the greatest number of tornadoes and the strongest tornadoes. As shown by the map key, wind speeds in Zone IV can be as high as 250 mph. The tornado hazard in Zone III, while not as great as in Zone IV, is still significant. In addition, Zone III includes coastal areas susceptible to hurricanes.

Your house was probably built in accordance with local building codes that consider the effects of minimum *design winds* . These are winds that, according to building code requirements, your house must be able to withstand. However, a tornado or hurricane can often cause winds much greater than those on which local building code requirements are based. Your house may be built "to code," but that does not mean that it can withstand winds from extreme events. If you are concerned about wind hazards where you live, especially if you live in Wind Zone III or IV, you should consider building a shelter.

Basis of Shelter Design

The purpose of a wind shelter is to provide a space where you and your family can survive a tornado or hurricane with little or no injury. You can build a shelter in one of several places in your house – in your basement, beneath a concrete slab-on-grade foundation or garage floor, or in an interior room on the first floor. Shelters built below ground level provide the greatest protection, but a shelter built in a first-floor interior room can also provide the necessary protection. Emergency response personnel and people cleaning up after tornadoes have often found an interior room of a severely damaged house still standing when little of the house remains above ground.


Surviving Interior Room

To protect its occupants, an in-house shelter must be able to withstand the forces exerted by high winds and remain standing, even if the rest of the house is severely damaged. Therefore:

- The shelter must be adequately anchored to resist overturning and uplift.
- The walls, ceiling, and door of the shelter must withstand wind pressure and resist penetration by windborne missiles and falling debris.
- The connections between all parts of the shelter must be strong enough to resist the wind forces without failing.
- If sections of either interior or exterior house walls are used as walls of the shelter, they must be separated from the structure of the house, so that damage to the house will not cause damage to the shelter.

The shelter booklet described on the other side of this brochure provides the information that you or your contractor will need to build a shelter that meets these requirements.

Did You Know...

...Almost every state in the United States is subject to hurricanes, tornadoes, or both. These extreme windstorms can cause extensive damage to buildings, and they threaten the lives of building occupants.

...FEMA, in cooperation with the Wind Engineering Research Center of Texas Tech University, has developed designs for wind shelters that homeowners can build inside their houses.

...These shelters are designed to provide protection from the forces of extreme winds as high as 250 mph, including the impact of windborne debris.

...FEMA has prepared ***Taking Shelter From the Storm: Building a Safe Room Inside Your House*** for homeowners and builders. The booklet includes:

- A homeowner risk assessment worksheet
- Guidance for selecting a shelter design
- Detailed construction plans for builders and contractors
- Cost estimates

Cross-section: typical crawlspace foundation, with shelter.

Want To Learn More?

Taking Shelter From the Storm: Building a Safe Room Inside Your House, FEMA publication 320 (booklet and construction plans), is available from FEMA Publications- The construction plans are also available separately – ask for FEMA publication 320a.

The booklet is also available on the FEMA website (www.fema.gov/mit/tsfs01.htm).

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Taking Shelter From the Storm:

Building a Safe Room Inside Your House

Federal Emergency Management Agency